UNITED STATES PATENT APPLICATION FOR
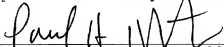
DEMAND ESTIMATION USING AUCTION PRICE ANALYSIS

Inventors:
Alex Zhang
Dirk Beyer
Julie Ward
Tongwei Liu

BACKGROUND OF THE INVENTION

Field of Invention

The present invention pertains to the field of demand estimation. More particularly, this invention relates to demand estimation using auction price analysis.

Art Background

It is often desirable in a marketing/sales or other application to determine the likely purchasing behavior of consumers in response to product pricing. Such a determination may be useful, for example, in setting product prices to achieve a desired sales target and/or in generating sales forecasts in response to product price changes.

One prior method for determining the likely purchasing behavior of consumers is to perform statistical regression analysis on point-of-sales data. Unfortunately, such a method usually requires complete data on sales activities and customer characteristics. As a consequence, such a method is usually complex and costly and often yields only limited success.

Other prior methods for determining the likely purchasing behavior of consumers include conducting consumer surveys by questionnaires and/or interviews and running product sales for limited times and/or at limited locations to gather relevant data. Unfortunately, such methods are usually relatively time-consuming and costly. In addition, such methods may be subject to errors caused by uncontrolled

factors such as weather conditions which may impact consumer shopping behavior as well as efforts by competitors to meet or beat a sales price.

SUMMARY OF THE INVENTION

A method is disclosed for generating a demand
estimate for a product. A method according to the
5   present teachings includes gathering a set of auction
data which is relevant to the product, removing from
the auction data all but a highest bid from each
unique bidder in the auction data, and correcting a
bias in the auction data caused by a set of
10   characteristics of an auction from which the auction
data is obtained. In one embodiment, the auction
data is obtained from an on-line auction which is
characterized by bidders not necessarily knowing the
start time of the auction.

15   Other features and advantages of the present
invention will be apparent from the detailed
description that follows.

BRIEF DESCRIPTION OF THE DRAWINGS

The present invention is described with respect
to particular exemplary embodiments thereof and
5   reference is accordingly made to the drawings in
which:

Figure 1 shows a price analyzer according to the
present teachings;

10

Figure 2 illustrates a set of auction data in
one embodiment;

Figure 3 shows a method for generating a bias-
15   corrected demand estimate according to the present
techniques;

Figure 4 shows an arrangement which includes an
auction price analyzer according to the present
20   teachings.

DETAILED DESCRIPTION

Figure 1 shows a price analyzer 12 according to the present teachings. The price analyzer 12 generates a bias-corrected demand estimate 14 for a product in response to a set of auction data 10 associated with the product.

The auction data 10 includes a set of bids obtained during an auction for the product. The bids recorded in the auction data 10 may be biased in comparison to a traditional auction due to the characteristics of the auction that yields the auction data 10. For example, the bids logged in the auction data 10 may be biased because the bidders in the auction did not necessarily know the start time for the auction whereas in a traditional auction the bidders are usually present for the entire duration of the auction. In one embodiment, the auction from which the auction data 10 is derived is an on-line auction such as one conducted via the Internet.

The product associated with the auction data 10 may be any product or any service or any combination of product/service.

The price analyzer 12 generates the bias-corrected demand estimate 14 by performing a statistical analysis to the auction data 10 to correct for the bias. The bias-corrected demand estimate 14 provides an estimate of the percentages of consumers that are likely to purchase the product at a set of possible prices for the product. The

bias-corrected demand estimate 14 may be represented
as a graph and/or table and may be represented in web
formats such as HTML, XML, etc.

5   The price analyzer 12 may be implemented in
hardware, software or a combination of
hardware/software.

       Figure 2 illustrates the auction data 10 in one
10   embodiment. The auction data 10 includes an entry 62
that provides information associated with a product
under auction including an Item_Identifier, a
Starting_Bid, a Starting_Time, and a Closing_Time.
The Item_Identifier uniquely identifies the product
15   under auction. The Starting_Bid is the starting bid
for the product under auction, the Starting_Time and
Closing_Time are the day, month, year, hour, and
second for the start and close of the auction,
respectively.
20

       The auction data 10 includes a set of bid
entries 62 each of which provides information
associated with a bid entered for the product during
the auction. Each bid entry 62 includes a
25   Bidder_Identifier that uniquely identifies the
corresponding bidder in a manner that enables the
detection of multiple bids by the same bidder. Each
bid entry 62 includes a Bid_Amount and a Bid_Time
that specifies the day, month, year, hour, and second
30   that the corresponding bid was made.

       In some embodiments, the auction data 10 may be
gathered manually. In other embodiments, the auction

data 10 may be gathered in an automated manner. For
example, a computer program may be used to gather the
auction data 10 from web sites that host on-line
auctions. Example web sites include e-bay.com,
5   yahoo.com and amazon.com to name a few examples.
Auction web sites commonly provide auction data to
buyers and sellers that participate in an auction in
order to enable participants to determine the correct
and fair workings of the auction. The auction data
10   on a web site may take the form of bid logs or a bid
history.

        Figure 3 shows a method for generating the bias-
corrected demand estimate 14 according to the present
15   techniques. At step 100, a set of relevant auction
data is gathered. Step 100 may include a sub-step of
searching through on-line auction web sites for
auctions for a relevant product. For example, if it
is desired to obtain a demand estimate for a
20   particular model of personal computer then web sites
may be searched for auctions of that particular model
or similar model using the Item_Ientifiers or similar
information from the on-line auctions. The auction
data for the relevant product is then gathered from
25   the web site and may be downloaded and stored locally
as the auction data 10 for further processing.

        At step 102, the auction data 10 is pre-
processed to remove all but the highest bid for each
30   unique bidder. For example, if multiple bid entries
62 of the auction data 10 specify the same
Bidder_Identifier then from those entries the one

with the highest Bid_Amount is retained and the rest
are discarded from the auction data 10.

5   At step 104, a statistical model is applied to
the auction data 10 to correct the biases caused by
the characteristics of the auction from which the
auction data 10 was obtained. Step 104 yields the
bias-corrected demand estimate 14 (x(p)) which is a
bias-corrected estimate of bidding at price level p.
10   x(p) represents the fraction of all consumers who are
willing to pay a price=p for the relevant product as
follows:

$$x(p) = \prod_{i=1}^{p-1} (1-f_i)$$

where f_i is the relative frequency count of the number
of bidders who bid price i as recorded in the auction
15   data 10.

      The function x(p) may be used to generate the
demand estimate 14 in a graph and/or tabular form
including HTTP and XML forms.

20

      Figure 4 shows a system which includes the price
analyzer 12 according to the present teachings. In
this system, the auction data 10 is contained on
auction web site 20 which is accessible via the
25   world-wide web 22. The prices analyzer 12 in this
embodiment is implemented in software on a web client
24. The web client 24 implements the appropriate
hardware/software, protocols, etc., for web
communication.

30

The price analyzer 12 searches for and finds the auction data 10 using the Item_Identifier in the auction data 10 and then downloads the auction data 10 into the web client 24 via the world-wide web 22 5   using web communication protocols.

The price analyzer 12 generates the bias-corrected demand estimate 14 and renders it in a graph 30 on a display 26. The bias-corrected demand 10   estimate 14 may be obtained by or transferred to other communication elements connected to the world-wide web 22.

The present techniques provide relatively low-15   cost and fast analysis in comparison to conventional methods. These techniques are non-intrusive to human subjects and enables near real-time detection of shifts in demands and prices. These techniques provide an independent source of demand and pricing 20   information which may be used to cross-check other available information.

In some embodiments, the price analyzer 12 may be implemented in an on-line auction web site as a 25   service to buyers and sellers who participate in auctions on the web site. Auction originators and bidders may benefit from the demand function provided by the price analyzer 12 in forming realistic price expectations and setting starting bids and reserve 30   prices and bidding strategies.

The foregoing detailed description of the present invention is provided for the purposes of

illustration and is not intended to be exhaustive or to limit the invention to the precise embodiment disclosed. Accordingly, the scope of the present invention is defined by the appended claims.